

REMARKS

In the January 18, 2006 Office Action, the Examiner noted that claims 1-20, 22-24, 26, 27, 29-31 and 33-43 were pending in the application and rejected all of the pending claims under 35 USC § 103(a) as unpatentable over an article entitled "Music Content Analysis through Models of Audition" by Martin et al. (Reference U in the January 18, 2006 Office Action) in view of U.S. Patent 5,918,223 to Blum et al. (Reference A in the June 17, 2004 Office Action). Claims 1-20, 22-24, 26, 27, 29-31 and 33-43 remain in the case. The Examiner's rejections are traversed below.

Newly Cited Article by Martin et al.

The article by Martin et al. cited in rejecting the claims contains a discussion of the direction taken in research at the Machine Listening Group at the Massachusetts Institute of Technology Media Lab in the 1990s to recognize features of music. There are no details of how anything discussed therein was accomplished. The majority of the article is a rebuttal of other techniques that emphasize analysis of music using music theory and graduate-level music students. Instead, Martin et al. recommends attempting to model the abilities and reactions of non-experts to music in psychoacoustic experiments involving "[r]eal music, taken directly from FM radio" (page 5, lines 16-17), for example. On pages 4-6, three case studies are discussed which were reported in other articles that were not cited in the rejection, but may have disclosed what was used to begin to accomplish these objectives.

The description of the first case study in Martin et al. (speech/music discrimination) mentions "13 features that were thought to be useful discriminators" (page 4, lines 28-29) and experiments that showed "using only a subset of the features" (page 4, line 38) produced "equivalent performance from a classifier working on the full 13-dimensional feature space" (page 4, lines 37-38), that revealed some features "are sufficiently correlated that only one need be used" (page 4, lines 39-40) and "various three-dimensional classifiers performed statistically equivalently" (page 4, line 42). The only features disclosed in the first case study were the following three in a "perceptual feature set" (page 4, line 43): spectral centroid variance, 4 Hz modulation energy and "pulse metric" (see page 4, line 45 to page 5, line 7).

The description of the second case study in Martin et al. (acoustic beat and tempo tracking), used "a constant-Q spectrogram, analyzing each channel for regions of sharply increasing energy, summing these regions across channel, and then calculating a phase-preserving narrowed autocorrelation to calculate tempo" (page 5, lines 18-20) or "decomposing

the signal into six bands with sharply-tuned bandpass filters, and then analyzing the periodicity of each band's envelope independently" (page 5, lines 21-22). "The estimates from the multiple subbands... [were] combined to give an overall estimate, and then the beat phase of the signal ... [was] estimated using simple heuristics" (page 5, lines 25-26).

The description of the third case study in Martin et al. (timbre classification), involving identification of musical instruments used to produce recordings, stated that "the most valuable features for source identification are related to the speed of energy buildup—as a function of frequency—during the onset of a note" (page 6, lines 12-14) which "is directly related to the Q (ratio of center frequency to bandwidth) of the nearby resonances in the system ... [and thus] is ... related closely to ... a 'steady-state' feature of the sound" (page 6, lines 15-17). Specifically, "the log-lag correlogram" (page 6, line 25) which "encodes many salient features, including formant structure, pitch vibrato and jitter, tremolo, and onset skew ... [which] have been shown to be important for source identification by humans and for subjective judgements of timbre" (page 6, lines 28-31) was used instead of "resorting to short-time Fourier analysis, formation of sinusoidal 'tracks,' or assumptions about 'onset' and 'steady state'" (page 6, lines 31-33).

Rejections under 35 USC § 103(a)

On pages 3-5 of the Office Action, claims 1, 3, 5 and 6 were rejected as unpatentable over Martin et al. in view of Blum et al. starting with an assertion that Martin et al. "teaches [a] method for building a computational model of human perception of music" (Office Action, page 3, lines 13-14). It is submitted that this vastly overstates what is disclosed by Martin et al. As discussed above, Martin et al. contains only a broad overview of experiments reported elsewhere. It is submitted that one of ordinary skill in the art with only the teachings in Martin et al. would be unable to build "a computational model of human perception of music" as asserted by the Examiner. All that Martin et al. provides is a direction in which to begin research on psychoacoustic analysis of music.

It was further asserted that "Martin specifically sets forth that only a human listener can 'identify genre' and realize 'what other pieces or kinds of music it bears similarity to'" without citing where Martin et al. makes these statements. In fact, these assertions of what is disclosed by Martin et al. appear to be contrary to the objective of further research set forth in Martin et al., i.e., "to build a system that can make some of the same judgments about ... [a] piece of music as the human listener can" (Martin et al., page 7, lines 5-6). Rather than making the first statement quoted in this paragraph, Martin et al. states that "the listener can say many interesting things about the music that are beyond our current ability to model[, including] identify[ing] the

genre of the music ..." (Martin et al., page 7, lines 8-9). In other words, Martin et al. indicates a lack of capability to automatically detect genre and a desire to do so. The ability of the present invention to do so meets an expressed need in the state of the art.

After acknowledging that Martin et al. "does not explicitly disclose combining parameters to compute a descriptor or the use of parameter weighting" (Office Action, page 4, lines 1-2) it was asserted that the teachings in Blum et al., which were discussed in the Amendment filed November 17, 2004, could be combined with the alleged teachings Martin et al. to make the claimed invention obvious. However, the overstatement of what was disclosed by Martin et al. combined with the lack of suggestion in either reference to combine their teachings makes the claimed invention non-obvious, as discussed below.

As discussed in the November 17, 2004 Amendment, Blum et al. discloses a program that creates weightings according to a formula and cleans up the data. On the other hand, Martin et al. does not disclose use of weightings for any purpose, or adjustment of any features "to find a set of weightings where each computed descriptor for each recording most closely matches perceptions reported for the recording by one or more human listeners" (e.g., claim 1, last 3 lines). Rather, as discussed above, Martin et al. only discloses sets of features that should be used in analyzing music. Even if a person of ordinary skill in the art were motivated to combine the teachings of Martin et al. and Blum et al., the result would be weighting of the features according to a formula, not using empirical data as recited in claim 1. Martin et al. only describes the use of human tests to validate the capabilities of the system and select features used by the system, not to adjust **how** the features are used. Thus, claim 1 patentably distinguishes over the combination of Martin et al. and Blum et al. for many of the same reasons as the combination of Blum et al. and Cluts et al. which was used to reject the claims in the June 17, 2004 Office Action.

Furthermore, it is submitted that the January 17, 2006 Office Action did not cite anything in the prior art that would suggest combining Martin et al. and Blum et al. to meet the limitations recited in the claims. On page 5 of the Office Action, the false assertion that Martin et al. states "only a human listener can 'identify genre' and realize 'what other pieces or kinds of music it bears similarity to'" was repeated as providing an "obvious motivation" to combine the teachings of Martin et al. and Blum et al. However, the statement in Martin et al. that such capabilities are desired would not lead a person of ordinary skill in the art to Blum et al., since Blum et al. does not provide that capability. It is only the subject application that has taught the Examiner the value of using weightings based on human perceptions of music. Nothing has been cited in the

prior art that provides any suggestion of adjusting weightings or any other reason for a person of ordinary skill in the art to combine the teachings of Martin et al. and Blum et al.

Since the last 3 lines of claims 3 and 5 and lines 17-19 of claim 6 all contain the limitation quoted above from claim 1, it is submitted that claims 1, 3, 5 and 6, as well as claims 2, 4, 7-9 and 34-41 which depend therefrom, patentably distinguish over Martin et al. and Blum et al. for at least the above reasons.

Claim 10 recites how input from human listeners is used in "adjusting the weightings ... to find a set of weightings where each computed difference number for each pair of recordings most closely matches perceptions reported for the pair of recordings by the one or more human listeners" (claim 10, last 3 lines). For reasons similar to those discussed above with respect to claim 1, there is no suggestion of this operation in Martin et al. and Blum et al. Therefore, it is submitted that claim 10 and claims 11-17, 42 and 43 patentably distinguish over Martin et al. and Blum et al. for at least the above reasons.

In the rejection of claim 18 (along with claims 7, 10-13, 19, 20 and 26) on the last four lines of page 5 and first 11 lines of page 6 in the Office Action, it is not clear where the limitation recited on the last five lines of claim 18 was allegedly disclosed by Martin et al. and Blum et al. The closest statement in the January 18, 2006 Office Action to these limitations is the assertion that Blum et al. "considers the likeness (i.e. similarities) between the extracted representation of the various musical recordings" (page 6, lines 1-2) and discloses "computing (calculate) the correlation between recorded sections (i.e. the stored numerical descriptors)" (page 6, lines 4-5). However, nothing was cited regarding where Blum et al. teaches or suggests specifically "computing from the extracted parameters for each of a plurality of pairs of the recordings a number which represents the difference between the recordings of the pair" (claim 18, lines 6-7) or "assembling the computed difference numbers into a database where each computed difference is associated with the identifier for each of the two recordings from which the difference was computed" (claim 18, last 3 lines). Furthermore, claim 26 recites "searching a database containing computed difference numbers between the target recording and a plurality of other recordings for those recordings which have a small computed difference number from the target music recording" (claim 26, last 3 lines). It is submitted that claims 18 and 26, as well as claims 20, 22-24, 27, 29-31 and 33 which depend therefrom, patentably distinguish over Martin et al. and Blum et al. due to the failure of these references, taken individually or in combination, to teach or suggest these operations.

Summary

It is submitted that the references cited by the Examiner, taken individually or in combination, do not teach or suggest the features of the present claimed invention. Therefore, it is submitted that claims 1-20, 22-24, 26, 27, 29-31 and 33-43 are in a condition suitable for allowance. Reconsideration of the claims and an early Notice of Allowance are earnestly solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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